Scope of Section on Microbiology

GREGORY SHWARTZMAN, *Chairman, Section on Microbiology*

I would like to begin the outline of the scope by stating that all members of the organizing group. namely, Drs. R. J. Dubos, F. L. Horsfall, Jr., J. G. Kidd, C. M. McLeod, H. Most, R. S. Muckenfuss and myself participated jointly and equally in the organization of the Section on Microbiology.

The task has been indeed a pleasant one due to the interest, encouragement and aid rendered to us by the Officers and the Council of the Academy. In particular, Drs. George Baehr, Waldo B. Farnum, Howard Reid Craig and Mahlon Ashford devoted much time to guide our initial steps.

Our sponsors who petitioned the Council to form this Section have been most generous in their support. The sponsorship by outstanding representatives of various fields of laboratory and clinical sciences affords the opportunity of organizing our work along broad lines dictated by the present-day needs, as we see them.

At the present stage of scientific development, we are confronted with two trends, seemingly opposing each other. Rapid progress necessitates specialization and concentrated efforts in limited fields. On the other hand, there is a continuous widening of the scope and ever-growing alliance of microbiology with other sciences, for mutual benefits.

For instance, some twenty-five years ago investigators dared not compare bacterial chemistry with that of animal cells. It would have been heresy to assume a similarity between the substances supporting bacterial growth and vitamins supporting growth of animal cells. Now we realize how closely related are the problems of bacterial and animal cell nutrition. As a matter of fact, appreciation of this relationship has been greatly responsible for some recent discoveries of vitamins of considerable importance in human nutrition.

Problems of general biology as important as those concerned with the nature of life have confronted the microbiologist investigating the nature of viruses.

The geneticist has enriched microbiology with ideas of genetic dissociation and, by the same token, supplied this science, as well as biochemistry, with new tools for the studies of cellular metabolism. In exchange, immunochemical investigations on type specificity of certain bacteria have unexpectedly assumed significance in genetics since they may aid in the identification of chemical agents involved in hereditary transmission of cellular characteristics.

The botanist and mycologist had long stood in isolation in their preoccupation with the classification of thousands of species of molds. However, the thankless and heroic task of classification has become most valuable when some seemingly useless molds proved to be great human benefactors.

Discoveries of chemotherapeutic agents made by the chemist played havoc with accepted ideas of immunology concerned with specific serum therapy and prophylaxis of certain diseases; while discoveries of antibacterial agents originating from bacteria and molds made by the microbiologist have challenged the skill of the organic chemist in chemical synthesis.

One could go on with examples of this sort, all serving to emphasize that it is most essential for the investigators in biological and medical sciences to be aware of each others problems, and above all, to look for correlation of rapidly accumulating new observations.

Due to its broad interests, The New York Academy of Medicine is best suited to provide a forum for exchange of information between allied groups of investigators. The scope of the new Section must be clearly defined but sufficiently broad in order to serve both the microbiologist and the scientists in allied fields.

The fields of interest to the Section will be bacteriology, mycology and parasitology; viruses and rickettsiae; maladies of unknown and uncertain etiology, possibly of infectious origin; immunology; chemother-

apy; pathology relative to microbiology; and methods of study adopted from related sciences, as applied to microbiology.

Our meetings will be preferably devoted to various aspects of single topics in the form of evening sessions and, from time to time, in the form of more extensive symposia.

Fellows of the Academy interested in the work of the new Section are cordially invited to enroll as its members. The meetings will be open, however, to all interested.

Tonight's session will deal with bacteriological, chemotherapeutic, and pathological aspects of tuberculosis.

We are happy to have Dr. Rene J. Dubos, one of the most outstanding microbiologists, to present the first paper of the first session, the paper on bacteriological aspects of tuberculosis.

*Bacteriological Aspects of Tuberculosis**

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In contrast to other living cells tubercle bacilli are not readily wetted by aqueous solutions in the usual bacteriological media. As their surface is strongly hydrophobic and lipophilic, the bacilli tend to grow in the form of clumps or pellicles instead of being dispersed throughout the aqueous phase. In addition to being the source of technical difficulties, this mode of growth gives rise to cultures consisting of heterogeneous cell populations. It has been found that a certain wetting agent (a water soluble ester of long-chain fatty acid, known under the name of Tween) has the property of wetting the surface of the bacillus and of permitting dispersed homogeneous growth. The use of this substance in culture media has led to the following findings:

Long chain fatty acids constitute a favorable source of carbon and energy for the growth of tubercle bacilli; other tissue substances (as yet unidentified) can also greatly stimulate the rate of growth. Serum albumin protects the bacilli from the toxic action of many substances which often contaminate bacteriological media. These observations may lead to the development of more rapid and effective techniques for the bacteriological diagnosis of tuberculosis.

The susceptibility of tubercle bacilli to certain antibacterial agents—to penicillin for example—is much increased when the wetting substance, Tween, is added to the test medium. This suggests that the resistance of these organisms may be due in part to the fact that the usual chemotherapeutic agents cannot normally reach the susceptible cellular structure of the bacterium.

Dispersed cultures are very convenient for the production of experimental infections. Inoculation of mice with cultures growing in the dispersed state has led to the following observations:

Mice of different genetic backgrounds exhibit great differences in susceptibility to tuberculous infection.

For any given mouse strain, the rate of development and outcome of the disease is markedly affected by environmental factors; in particular, by the state of nutrition and by other concomitant pulmonary infections caused by filtrable viruses.

The virulence of different cultures of tubercle bacilli for mice (and for other animals) is correlated with marked differences in the morphological and immunological characteristics of the bacilli. It is hoped that the chemical identification of the factors responsible for these differences may lead to a better understanding of the nature of virulence and to a more rational approach to the problem of immunization.

* A complete paper will appear in this *Bulletin* at a later date.